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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/653,390	09/01/2000	Salvatore Coffa	99CT22053527	7100

7590

12/09/2003

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EXAMINER.

WILLE, DOUGLAS A

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 12/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/653,390

Applicant(s)

COFFA ET AL.

Examiner

Douglas A Wille

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 September 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 28,31-38 and 41-47 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 28,31-38,41-47 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. Claims 28, 31 - 38 and 41 - 47 rejected under 35 U.S.C. 103(a) as being unpatentable over Benton et al. in view of Franzo et al.
3. With respect to claims 28 and 38, in so far as they are understood, Benton et al. show a laser (cover Figure and column 2, line 59 et seq.) with a semiconductor substrate 31, a doped p/n junction 33-34 which inherently has a depletion region, a shape (ridge) defining a waveguide (column 3, line 67) and is doped with Er. The Er is in the core region 33 which will contain the depletion region. The device can serve as a coherent light source (laser) (column 4, line 67). Benton et al. do not show the biasing source but it is assumed to provide a forward bias, as is customary with a laser. Franzo et al. show that for Er doped Si diodes a higher output is obtained when a reverse bias is applied and it would have been obvious to modify the Benton et al. device to include the reverse bias shown by Franzo et al. to provide a greater output. Note that the Er is in the core region which contains the depletion region and the region forms a p/n junction with the surrounding regions.
4. With respect to claims 31 and 41, the rare earth is Er.
5. With respect to claims 32 and 42, a clad layer of SiO₂, 23, is shown by Benton et al. (see Figure 2 and column 3, line 66) and this has a lower dielectric constant than the Si.
6. With respect to claims 33 and 46, the 32-33 interface provides a high index/low index intersection which functions as a reflection layer.

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7. With respect to claims 34 and 44, forming the device on an SOI substrate is an obvious design alternative since the same device could be formed while gaining the advantages of the SOI structure such as isolation from substrate noise injection.

8. With respect to claims 35 and 45, Benton et al. show the layers are epi (column 4, line 27).

9. With respect to claims 36 and 43, the Benton et al. structure is ribbed.

10. With respect to claims 37 and 47, the Benton et al. substrate is Si.

11. Claims 28, 31 - 38 and 41 - 47 rejected under 35 U.S.C. 103(a) as being unpatentable over Benton et al. in view of Coffa et al.

12. With respect to claims 28 and 38, in so far as they are understood, Benton et al. show a laser (cover Figure and column 2, line 59 et seq.) with a semiconductor substrate 31, a doped p/n junction 33-34 which inherently has a depletion region, a shape (ridge) defining a waveguide (column 3, line 67) and is doped with Er. The Er is in the core region 33 which will contain the depletion region. The device can serve as a coherent light source (laser) (column 4, line 67). Benton et al. do not show the biasing source but it is assumed to provide a forward bias, as is customary with a laser. Coffa et al. show that for Er doped Si diodes a higher output is obtained when a reverse bias is applied and it would have been obvious to modify the Benton et al. device to include the reverse bias shown by Coffa et al. to provide a greater output. Note that neither Benton et al. nor Coffa et al. show the biasing device but since a bias is applied it must obviously be supplied by a biasing device. Note that the Er is in the core region which contains the depletion region and the region forms a p/n junction with the surrounding regions.

13. With respect to claims 31 and 41, the rare earth is Er.

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14. With respect to claims 32 and 42, a clad layer of SiO₂, 23, is shown by Benton et al. (see Figure 2 and column 3, line 66) and this has a lower dielectric constant than the Si.

15. With respect to claims 33 and 46, the 32-33 interface provides a high index/low index intersection which functions as a reflection layer.

16. With respect to claims 34 and 44, forming the device on an SOI substrate is an obvious design alternative since the same device could be formed while gaining the advantages of the SOI structure such as isolation from substrate noise injection.

17. With respect to claims 35 and 45, Benton et al. show the layers are epi (column 4, line 27).

18. With respect to claims 36 and 43, the Benton et al. structure is ribbed.

19. With respect to claims 37 and 47, the Benton et al. substrate is Si.

Response to Arguments

20. Applicant's arguments filed 9/5/02 have been fully considered but they are not persuasive.

21. Applicant argues that hindsight is applied to combine Benton et al. with Franzen et al. or Coffa et al. but note that both of the latter references provide a method of increasing the output of a device such as Benton et al. show. However, hindsight is not required to recognize an improvement in a known structure. Thus Franzen et al. and Coffa et al. teach a method of improving the output of a junction device and that is the motivation and the motivation is provided by the references.

22. Applicant states that lasers and LEDs are very different but in fact, they share common structures and differ mainly in the addition of a resonator structure for a laser but as noted by

Applicant, Benton et al. do show a laser application. Applicant also states that Benton et al. only show room temperature operation in generalized statement. So what, since it is shown.

23. Applicant argues that Franzen et al. and Coffa et al. only show LEDs but as noted above the similarities of lasers and LEDs is such that what applies to one would apply to the other, in so far as emission characteristics are concerned.

24. Applicant states that LEDs can stand to have sources of inefficiency related to dopant placement but note that efficiency is of paramount importance to both lasers and LEDs since inefficiency, while lowering output, will also cause heating which in turn may prevent CW operation and may preclude operation without a cooler. Thus distinctions between the two devices are not significant.

Conclusion

25. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

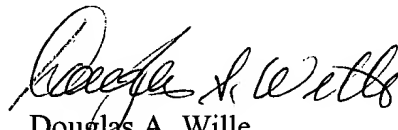
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas A Wille whose telephone number is (703) 308-4949. The examiner can normally be reached on M-F (6:15-2:45).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.


Douglas A. Wille
Primary Examiner

December 6, 2003